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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/090,851	03/04/2002	Shigeki Sakai	F-7337	5906

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EXAMINER

FENTY, JESSE A

ART UNIT	PAPER NUMBER
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2815

DATE MAILED: 06/06/2003

8

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/090,851

Applicant(s)

SAKAI ET AL.

Examiner

Jesse A. Fenty

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 March 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Objections

1. Claims 8-12 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 8-12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- a. The claims do not further define the metes and bounds of the preceding claims.
- b. The claimed statutory class of the dependent claims is unable to be determined.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this

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subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1 and 4-7 are rejected under 35 U.S.C. 102(e) as being anticipated by Hsu et al. (U.S. Patent No. 6,462,366 B1).

In re claim 1, Hsu discloses a semiconductor device, comprising a ferroelectric nonvolatile storage element including a field effect transistor:

Wherein the field effect transistor includes a structure successively laminated with a first insulator layer (88), a first conductor layer (96), a ferroelectric layer (98) and a second conductor layer (116) on a channel region of a semiconductor substrate;

Wherein the field effect transistor includes a third conductor (114) and a fourth conductor (118) respectively formed on a source region and a drain region on both sides of the channel region of the semiconductor substrate, further comprising:

A second insulator thin film (102) between the third conductor and the fourth conductor and the first conductor layer.

In re claim 4, Hsu discloses the device of claim 1, wherein an area of the second conductor layer above the ferroelectric layer is made smaller than an area of the ferroelectric layer.

In re claim 5, Hsu discloses the device of claim 1, wherein the second conductor layer is disposed above an element isolating region (112) of the semiconductor substrate.

In re claim 6, Hsu discloses the device of claim 1, wherein each of the first insulator layer (88) and the second insulator layer thin film (102) comprises a layer of one material selected from a group consisting of silicon oxide (column 4, line 27) and silicon nitride (column 4, lines 59-61).

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In re claim 7, Hsu discloses the device of claim 1, wherein the ferroelectric layer is $\text{Pb}(\text{Zr}, \text{Ti})\text{O}_3$ or $\text{SrBi}_2\text{Ta}_2\text{O}_9$ (column 3, line 29).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hsu as applied to claim 1 above, and further in view of Fukuzumi et al (U.S. Patent No. 6,403,444 B2).

In re claim 2, Hsu disclose the device of claim 1, but does not expressly disclose a side wall of the first conductor comprising recesses and projections. Fukuzumi discloses a first conductor (7) with a side wall comprising recesses and projections. It would have been obvious to one skilled in the art at the time of the invention to use a recessed and projected configuration as disclosed by Fukuzumi for the device of Hsu for the purpose, for example, of increasing the surface area of the lower electrode, thus increasing the capacitance storage area (Fukuzumi; column 1, lines 38-50).

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hsu ('366) as applied to claim 1 above, and further in view of Hsu et al. (U.S. Patent No. 6,146,904).

In re claim 3, Hsu ('366) discloses the device of claim 1, but does not expressly disclose that the substrate could be an SOI substrate. Hsu ('904) discloses a similar ferroelectric

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semiconductor device that may comprise a SOI substrate (column 2, lines 35-37). It would have been obvious to one skilled in the art at the time of the invention to use an SOI substrate as suggested by Hsu ('904) for the device of Hsu ('366) for the purpose, for example, of decreasing leakage currents in the substrate.

Conclusion

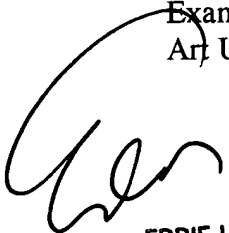
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jesse A. Fenty whose telephone number is 703-308-8137. The examiner can normally be reached on 5/4-9 1st Fri. Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on 703-308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-746-3892 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

JAF
June 1, 2003

Jesse A. Fenty
Examiner
Art Unit 2815


EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800